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ABSTRACT

Two films, "Oxygen Breathing Apparatus Type A-3" and "Damage Control Petty Officer," were developed using an educational systems approach and based on 15 behavioral objectives. The effectiveness of each film was tested using three samples: one which was pretested, viewed the film, and was posttested; another which was pretested and posttested but did not view the film; and another which was tested without viewing the film. Results showed that viewing the film significantly improved posttest scores, especially for viewers of high intelligence, but the films failed to achieve the 80 percent proficiency which had been desired. Though modifications will be necessary to make the films meet minimal achievement standards, both films showed themselves to be significant aids in the instructional process. The report discusses in detail the statistical significance of the test results. (EMH)

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CNETS REPORT 4-75

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TRAINING EFFECTIVENESS OF
FILMS DEVELOPED USING
SYSTEMS APPROACH TO
TRAINING PRINCIPLES

U.S. DEPARTMENT OF HEALTH,
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CNETS REPORT 4-75

TRAINING EFFECTIVENESS OF
FILMS DEVELOPED USING
SYSTEMS APPROACH TO TRAINING PRINCIPLES

(CNETS Field Task Number 50052-21-PA-08)

Prepared for
THE CHIEF OF NAVAL EDUCATION AND TRAINING SUPPORT

By

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AUGUST 1975

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1.0 SUMMARY. The Oxygen Breathing Apparatus Type A-3 film (OBA film) and Damage Control Petty Officer film (DCPO film) were evaluated for training effectiveness. Three different recruit groups (Exp 1, Exp 2, and Con groups) were used to evaluate each film. The Exp 1 groups were pre-tested for entrance level knowledge, viewed the film, and received a post-test to determine whether the knowledge level had improved. The Exp 2 groups were not pre-tested, but did view the film and received the post-test. The Con groups were pre- and post-tested but did not view the film. In addition, enlisted personnel with over two years of Navy experience who were attending a damage control familiarization course at a DC School were tested. These more experienced personnel were divided into two groups -- DC School Exp group and DC School Con group. The DC School Exp group was pre-tested, viewed the DCPO film, and then post-tested. The DC School Con group was pre- and post-tested, but did not view the DCPO film. The results showed that (a) recruits who viewed the films had significantly higher post-test scores than recruits who did not view the films, (b) those recruits who were pre-tested had post-test scores similar to those recruits who were not pre-tested even though the pre- and post-tests were duplicates, (c) personnel with over two years of Navy experience had significantly higher scores on the DCPO pre-test than the recruit

groups, (d) the post-test performance of these experienced personnel improved as a result of viewing the DCPO film, (e) and pre- and post-test performance by recruits for the OBA film was significantly better than pre- and post-test performance by recruits for DCPO film even though both recruit groups were similar in age, years of education, reading skill level, and intelligence. The results also show that those recruits who were more intelligent (higher GCT scores), and had better reading skills, had higher post-test scores on both films than recruits who were less intelligent and had poor reading skills. Intelligence, however, appeared to be more important than reading skills to OBA post-test performance. Strong agreement was also found among education specialists who matched the pre- and post-test items with the Specific Behavioral Objectives (SBOs) that were listed for each film. Further analysis showed that only eight of the 15 SBOs listed for the OBA film were trained to the 80% criterion level, while the DCPO film did even more poorly, training only three of the 15 SBOs to this level. Despite these poor achievement levels, the conclusion is made that training can be more effectively managed with these film programs than with any other films that are currently available because the use of SBOs permits accurate correction of inadequate scenarios, while pre- and post-testing allows for more valid measurement of achievement

and more effective training management. The recommendation is made that the System Approach to Training (SAT) principles that were used in developing these film programs be used in managing future film procurements.

2.0 ACKNOWLEDGEMENTS. This CNETS task could not have been completed without the cooperation of the Recruit Training Command and Service School Command, San Diego, especially LCDR Gary Johnson. Special appreciation is also extended to Mr. Phillip Wulff who tested the subjects and organized the data. The assistance of Lucille Shirk and Robert Doucette of NAVEDTRAPRODEVCON in providing statistical programs, and of Joyce Singleton in performing the statistical analyses, is gratefully acknowledged. Mr. Gary Bunde was responsible for managing the early phases of this evaluation, including the tasking of NAVEDTRASUPPCENPAC and approval of the experimental design. Appreciation is also extended to Mrs. Cathie Dunning for her careful handling of the manuscript.

3.0 PURPOSE. This report presents the results of an effectiveness evaluation of two films which were developed using the concepts and methodologies of the Systems Approach to Training (SAT) as presented by Havens et al.¹ In

¹ Havens, C.B., Prophet, J.E., Thrash, N.E., and McKibben, J.R. Introduction to the Systems Approach to Naval Air Basic Training. CNABT P-802 PAT, Chief of Naval Air Basic Training, Pensacola, Florida, 1968.

addition, data on factors which may have been involved in the training effectiveness of these films, including reading skills, general intelligence, education level, and Navy experience, are presented.

4.0 BACKGROUND. This task originated with CNETS letter N44/HHK:dpg of 26 July 1972 which requested the Naval Training Equipment Center to manage the procurement of two training films. The first of these films would train for the operation and use of the Oxygen Breathing Apparatus Type A-3 (referred to as the OBA film), and the second film would train for the duties of the departmental and division Damage Control Petty Officer (referred to as the DCPO film). This request was unique among training film procurements in that this was the first procurement to be made within the Naval Training Command, and it was the first procurement to specify the development of a Film Utilization Guide for each film. The purpose of this guide was to provide the instructor with information to better manage the film presentation for training purposes.

Approval of the film request was provided in CNO letter OP-991G/js Ser 835 P991 of 14 Dec 1972. Procurement of these films was to be made on a pilot basis in order to determine whether the improved training methodologies and techniques available within the Naval Training Command would

result in films that were "pedagogically more effective" than films procured from other sources.

Although these films had been evaluated for technical accuracy by the Chief of Naval Technical Training, the training (or pedagogical) effectiveness of the films remained to be demonstrated. A request for an effectiveness evaluation was therefore sent to the Naval Education and Training Support Center Pacific (NAVEDTRASUPPCENPAC) in CNETS letter Code N-2131:mvc of 1 Nov 1974. The results of this evaluation, as described in the following paragraphs, were submitted in NAVEDTRASUPPCENPAC ltr N1:PW:jmh 1591-3 ser 601 of 25 Apr 1975.

5.0 METHODS. The following subjects, tests, procedures, and statistical analyses were used in performing the evaluation.

5.1 Subjects. Eight different groups of subjects were used in this evaluation. All groups consisted of male enlisted personnel who were on active duty in the U.S Navy. Three groups participated in the evaluation of the OBA film, and five groups were used to evaluate the DCPO films.

Table 1 presents a summary of the groups and conditions used in this evaluation. As this table shows, the three groups involved in the OBA evaluation consisted of Navy recruits who were in the third week of training at the Recruit Training Command, San Diego, California. Two

experimental groups and a single control group were tested. The two experimental groups received the film, while the control group did not. The first experimental group (OBA Exp 1) was administered a pre-test before viewing the film. Immediately after the film, they were administered a post-test. The second experimental group (OBA Exp 2) did not receive a pre-test but was administered the post-test after viewing the film. The third group was a control group (OBA Con) which was administered both the pre- and post-tests, but did not view the film between tests.

Further examination of Table 1 shows that three of the five groups used in the DCPO film evaluation consisted of Navy recruits who were tested under the same conditions as the three OBA recruit groups. These three groups will be referred to as the DCPO Exp 1, DCPO Exp 2, and DCPO Con groups. The two remaining groups consisted of students who were attending a 1-day familiarization course at the Damage Control (DC) School, Service School Command, San Diego. These were enlisted male personnel who were permanently attached to local commands and were attending this course to review basic damage control procedures. They represented several different ratings (mostly BTs, BMs, ENs, HTs, and RMs) and pay grades. The data from these last two groups would provide some information on the effectiveness of this film among more experienced Navy enlisted personnel. The

first of these two groups took the pre-test, viewed the film, and was then administered the post-test, while the second group did not view the film but took both tests. The first group will be referred to as the DC School Exp group, and the second group will be identified as the DC School Con group.

Table 2 lists the average age, years of education, General Classification Test (GCT) scores, and reading skill levels (Gates-MacGinitie, vocabulary and comprehension sections) of the three recruit groups who participated in the OBA and DCPO evaluations, and the average age, education level, years in the Navy, pay grade, and months in pay grade of the two DC School groups who were subjects in the DCPO evaluation.

5.2 Film and Test Development. As mentioned above in paragraph 4.0, these films were unique because the training methods and techniques of the Systems Approach to Training were used to develop the film programs. These programs established a set of 15 Specific Behavioral Objectives (SBOs) to be trained by each film. The film scenarios were subsequently designed around these SBOs. The SBOs are presented in Appendix A in the order listed in the Film Utilization Guides.

In keeping with SAT principles, pre- and post-testing questionnaires and test administration procedures were also

designed into the film programs. The pre-test, which was administered before viewing the films, measured the entrance level knowledge which the subjects had of each SBO. Following training, a post-test was administered in order to measure SBO achievement which resulted from viewing the films. A list of the test items for each film, as published in the Film Utilization Guides, is presented in Appendix A. The Film Utilization Guides were also designed to improve management of training. The guides identified the appropriate audience, listed the terminal objectives to mention in introducing the film, described the pre/post test administration procedures, and explained the usefulness of pre- and post-testing as measures of training effectiveness. The following materiel numbers (MN) were assigned to the film programs by the Naval Photographic Center: MN 11369 (OBA film) and MN 11370 (DCPO film).

5.3 Evaluation Procedures. The recruit subjects were randomly divided into three groups (Exp 1, Exp 2, and Con) for each of the two films and taken to separate classrooms. The pre-tests were administered to the Exp 1 and Con groups, followed by introduction and presentation of the films to the Exp 1 and Exp 2 groups. The Con groups were allowed free discussion during this period. The post-test was then administered to all groups. These procedures were also used to test the two DC School groups. These DC subjects were

tested and shown the films prior to the start of the familiarization course.

5.4 Matching SBOs and Test Items. In order to determine whether the SBOs were accurately represented by the test items, a group of five education specialists (GS 1710 series), at or above the GS-12 level, were asked to match each test item to the SBO which they judged to be the most appropriate. Half of this group matched the SBOs and test items for the OBA film first, followed by matching for the DCPO film, while the other half matched for the DCPO film first and then the OBA film.

5.5 Statistical Analyses. A one-way analysis of variance (ANOVA) for unequal n's was used to determine whether significant differences existed across groups for pre-test and post-test scores, or for such factors as age, education, reading skill levels, and so forth. Comparisons between groups were made using t-tests for uncorrelated samples. The relationship of several aptitude and demographic factors to post-test scores was determined using Pearson product-moment correlations. A multiple regression analysis was performed in order to determine which of these correlations accounted for unique post-test variance. The significance level was established at $p \leq .05$ (two-tailed).

6.0 RESULTS. The following differences and correlations

were found among groups and conditions.

6.1 Agreement Between SBOs and Test Items. Matching of SBOs and test items by the education specialists was in agreement in 93.33% of the cases for the OBA film, while for the DCPO film the level of agreement was 98.67%. Each film had a total of 75 judgments to be made by the five education specialists. Five of these judgments were in disagreement for the OBA film, while only a single disagreement occurred for the DCPO film. Table 3 shows which SBOs were judged by most of the education specialists to match each test item for the two films. As this table shows, the listing of SBOs in the Film Utilization Guide for the OBA film does not correspond to the listing of test items, indicating that the SBOs and test items were not cross-referenced in the OBA guide.

6.2 Differences Among Aptitude and Demographic Factors. The ANOVAs did not show any significance differences among the three OBA recruit groups (Exp 1, Exp 2, and Con groups) in GCT scores, reading skill levels, age or years of education. Years of education did not differ among the five DCPO groups (three recruit groups and two DC School groups), although age was found to differ significantly among the five groups ($F=16.963$; $df=4/237$; $p<.01$). A series of t-tests showed that the three DCPO recruit groups did not differ significantly in age, nor did the two DC School groups. The

mean age of the combined DCPO recruit groups, however, did differ significantly from the mean age of the combined DC School groups (see Table 4), with the DC School group being older. Neither of the two DC School groups differed significantly from each other in years in Navy, pay grade, or months in pay grade. Some differences in GCT scores and reading skill levels were found, however, among the three DCPO recruit groups. Although the DCPO Exp 1 and Con Groups had similar GCT scores, Table 4 shows that these two groups combined had significantly lower GCT scores than the DCPO Exp 2 group. In addition, Table 4 shows that the reading skill level of the DCPO Con group was significantly lower than the reading skill level of the DCPO Exp 1 group, while the reading skill level of the DCPO Exp 1 group was significantly lower than that of the DCPO Exp 2 group.

6.3 Differences in Pre- and Post-Test Scores. The ANOVA for the pre-test scores of the five DCPO groups resulted in a significant F ($F = 137.797$; $df=3/202$; $p<.01$). Subsequent t-tests did not show any significant differences among the two recruit groups which received pre-tests (DCPO Exp 1 and Con groups), or between the two DC School groups. As shown in Table 4, the combined recruits groups did, however, differ significantly for the combined DC School groups, with the DC School groups having significantly higher pre-test scores.

The ANOVA found that post-test scores also varied significantly among the five DCPO groups ($F=81.819$; $df=4/237$; $p<.01$). T-tests presented in Table 4 show that the DCPO Exp 1 group had significantly lower post-test scores than the DCPO Exp 2 group and significantly higher post-test scores than the DCPO Con group. Table 4 shows further that the post-test scores of the DC School Exp group were significantly higher than the post-test scores than the DC School Con group. In addition, the t-tests in Table 4 indicate that the DC School Exp group had significantly higher post-test scores than the DCPO Exp 1 recruit group.

A t-test showed that pre-test performance of the OBA Exp 1 and Con recruit groups was similar, while an ANOVA showed that post-test performance did vary significantly among the three OBA groups ($F=238.9$; $df=2/198$; $p<.01$). The OBA Exp 1 and Exp 2 groups did not differ in post-test performance, while the post-test scores of these two groups combined were significantly higher than the post-test scores of the OBA Con group (see Table 4). Further data presented in Table 4 show that both the pre- and post-test performance of the OBA Exp 1 recruit group differed significantly from the pre- and post-test performance of the DCPO Exp 1 recruit group. The pre- and post-test scores of the OBA Exp 1 group were significantly higher than the scores of the DCPO Exp 1 group. The two groups did not differ significantly in age,

years of education, GCT scores, or reading skill levels. Table 5 presents summary statistics for the pre- and post-test scores of the three OBA and five DCPO groups.

6.4 Correlations Between Aptitude and Demographic Factors and Post-Test Scores. Regression analysis of GCT scores, reading skill levels, age, and years of education with post-test scores for the combined OBA Exp 1 and Exp 2 recruit groups showed that post-test performance was significantly associated with GCT scores ($r = .346$; $df=136$; $p<.01$) and reading skill level ($r = .26$; $df=136$; $p<.01$). The multiple R was .351, with GCT scores accounting for most of the post-test performance variance. GCT scores had a beta weight of .300 and reading skill level had a beta weight of .074. These results were replicated in the combined DCPO Exp 1 and Exp 2 recruit groups. For these DCPO groups, GCT scores correlated .401 with post-test performance ($df=129$; $p<.01$), while reading skill level correlated .45 with post-test scores ($df=129$; $p<.01$). The multiple R resulting from these two factors was .466, with the beta weight for GCT being .174, while the beta weight for reading skill level was .324.

A regression analysis was also performed on the relationship between the post-test performance of the DC School Exp group and several factors including age, years of education, years in Navy, pay grade, and months in pay

grade. Only months in pay grade was significantly associated with post-test scores ($r=.423$; $df=22$; $p<.05$).

6.5 Achievement Levels for SBOs. An analysis was also made of the percentage of combined Exp 1 and Exp 2 recruit groups who met each of the 15 SBOs developed for the two films. This analysis showed that achievement varied substantially between the two sets of SBOs. If a 95% achievement criterion were established for an SBO (that is, 95% of the trainees had to get the appropriate test item correct), then only two SBOs in the OBA film (Nos. 2 and 14) would have been satisfactorily trained, while none of the SBOs for the DCPO film met this criterion. Adoption of a 90% criterion would add only a single SBO to those met by the OBA film (No. 15), while none of the SBOs for the DCPO film would have reached this level. An additional five SBOs (Nos. 1, 7, 9, 11, and 13) would have been met by the OBA film if an 80% criterion were established, while only three SBOs (Nos. 6, 7, and 10) would have been trained to this level by the DCPO film.

7.0 DISCUSSION. These results indicate that significant overall improvements occurred in knowledge of the A-3 Oxygen Breathing Apparatus and duties of Damage Control Petty Officer as a result of viewing the OBA and DCPO films. Improvements in DCPO post-test performance were found for both experienced enlisted personnel who had an average of over

two years of Naval service and inexperienced recruits. Post-test performance also appears to be related to intelligence and reading skills. In addition, strong agreement was found between the SBOs and test items as judged by professional education specialists, although the sequence of SBOs and test items listed for the OBA film in the Film Utilization Guide were dissimilar. This inconsistency could prove confusing to instructors who are trying to identify specific training deficiencies through post-test scores.

The recruits appeared to have a higher entrance knowledge level for the OBA information than for the DCPO information. In addition, the knowledge of those recruits who were trained on the OBA film improved more than the knowledge of those who were trained on the DCPO film. None of these pre- or post-test differences between the OBA and DCPO recruit groups were related to differences in intelligence (GCT), reading skill, age, or years of education. It was also found that experienced personnel who viewed the DCPO film entered at significantly higher knowledge levels than the recruit groups, and had significantly higher post-test scores as well. These results indicate that over two years of Navy experience have been effective in training many of the SBOs, and that the film was effective in significantly improving knowledge of damage control procedures among the experienced trainees.

The results also demonstrated that exposure to the pre-test did not modify performance on the post-test. For those recruits who viewed the DCPO film, the reverse was true--the post-test performance of those who were pre-tested was worse than the post-test performance of those who did not receive the pre-test. The better post-test performance of those who were not pre-tested is probably related to the higher GCT scores and reading skill levels of this group. The absence of better post-test performance among the pre-tested groups is an important finding because the pre-and post-tests were duplicates, and were administered about 30 minutes apart. The probability appeared high that the pre-tested subjects would have had a learning advantage because they may have been more familiar with the content of the SBOs. The failure to show a pre-testing advantage makes it unnecessary to design separate post-tests in order to measure the training effectiveness of films.

These results also show that post-test performance among recruits on both films was related to GCT scores and reading skill levels. Those who had higher verbal intelligence and better reading skills had higher post-test scores and apparently learned more from the films. Reading skills appeared to be more important to DCPO post-test performance than to performance on the OBA post-test. For the more experienced Navy personnel (DC School group), months in pay grade was

associated with post-test performance. Being in pay grade longer is indicative of more experience in grade, and this experience may have provided this group with a learning advantage while viewing the DCPO film.

Although post-test comparisons between experimental and control groups showed that the films significantly improved subject matter knowledge, the level of improvement did not meet the minimal achievement criterion (80%) usually adopted for training. This was especially true of the DCPO film. The present evaluation does demonstrate, however, that training can be managed more effectively with these films than with any other films that are currently in the training inventory. Effective training management was made possible by developing a set of SBOs, and measuring SBO achievement through pre- and post-testing. Both individual learning and system operation can be more precisely and effectively managed on the basis of these post-test data than is possible with any other available program. This precision could reduce unnecessary retraining of individuals as well as unnecessary modifications in the training system, thereby resulting in improved training at less cost. On the basis of the present evaluation, for example, the film scenarios related to those SBOs which had low overall achievement levels can now be identified, corrected, and re-evaluated.

Although secondary to the above evaluation, the fol-

lowing observations may help improve the training effectiveness of these films. A review of the Film Utilization Guides indicates that some revision may be necessary if instructors are to understand and follow the training principles involved. Instructors should be provided with a more thorough explanation of the pre- and post-tests, especially the association between test items and SBOs, and the ways in which individual training deficiencies can be identified from post-test scores. As mentioned above in paragraph 6.1, the list of the SBOs and test items should be accurately cross-referenced. In addition, the pre-test should be used to identify those who have met the SBO achievement levels and will not have to participate in film training.

8.0 CONCLUSIONS. The following conclusions are made from the above results:

8.1 Recruits who viewed the films had significantly higher post-test scores than recruits who did not view the films.

8.2 Personnel with over two years of Naval service had significantly higher scores on the damage control pre-test than the recruit groups.

8.3 The post-test scores of these experienced personnel improved significantly as a result of viewing the damage

control film.

8.4 The pre- and post-test performance of recruits who viewed the oxygen breathing apparatus film were significantly higher than the pre- and post-test scores of the recruits who viewed the damage control film.

8.5 Post-test performance by recruits was significantly related to intelligence and reading skill level.

8.6 Pre-testing did not appear to modify post-test performance.

8.7 Education specialists showed high agreement in matching test items and Specific Behavioral Objectives (SBOs).

8.8 The post-test SBO achievement levels attained by recruits who viewed the films were below normally accepted standards.

9.0 RECOMMENDATIONS. The following recommendations result from the above conclusions.

9.1 The films would be useful in training both recruits and experienced Navy personnel.

9.2 Some modifications in the film scenarios will be necessary if the films are to meet minimum achievement standards.

9.3 These modifications will be easier than with other current films because the use of SBOs permits accurate

identification of inadequate scenarios.

9.4 The Film Utilization Guides, especially for the oxygen breathing apparatus film, should cross-reference SBOs and test items. In addition, a more thorough explanation of the purpose of SBOs and pre/post-testing should be provided so that instructors can more effectively manage the training situation.

9.5 Duplicate pre- and post-tests can be used without modifying the usefulness of these measures.

9.6 Less intelligent viewers or viewers with poor reading skills may have to be provided with additional or supplemental instruction if minimal achievement levels are to be attained.

TABLE 1

Summary of Evaluation Design.

Film	Group Name	N	Group Composition	Viewed Film?	Tests Taken
OBA	OBA Exp 1	94	Recruits	Yes	Pre, Post
	OBA Exp 2	44	Recruits	Yes	Post only
	OBA Con	63	Recruits	No	Pre, Post
DCPO	DCPO Exp 1	93	Recruits	Yes	Pre, Post
	DCPO Exp 2	36	Recruits	Yes	Post only
	DCPO Con	73	Recruits	No	Pre, Post
DCPO	DC School Exp 1	23	Experienced*	Yes	Pre, Post
	DC School Con	17	Experienced	No	Pre, Post

*Averaged over two years of Naval service.

TABLE 2

Demographic and Aptitude Factors for
Different Subject Groups.

Recruit Groups

Subject Group	Age		Years Education		GCT Scores		Reading Skill Level	
	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd
OBA Exp 1	18.94	1.90	11.55	1.11	52.66	9.72	10.06	2.15
OBA Exp 2	20.09	2.44	11.90	1.26	55.20	7.55	10.31	1.91
OBA Con	18.59	1.41	11.37	1.23	51.70	9.09	9.87	1.89
DCPO Exp 1	18.88	1.88	11.42	1.45	51.65	8.25	9.64	2.10
DCPO Exp 2	19.33	2.22	11.61	0.89	56.13	7.44	10.61	1.39
DCPO Con	19.30	2.21	11.71	1.43	49.40	8.48	8.95	2.33

DC School Groups

Subject Group	Age		Years Education		Years in Navy		Pay Grade		Months in Pay Grade	
	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd
DC School Exp	21.30	2.74	11.93	1.07	2.99	2.84	3.74	0.99	16.10	13.21
DC School Con	23.65	4.65	12.47	1.33	4.80	4.73	4.12	1.18	36.02	47.15

TABLE 3

Matching of SBOs and Test Items
by Education Specialists.*

OBA Film		DCPO Film	
SBO No.	Matching Test Item No.	SBO No.	Matching Test Item No.
1	1	1	1
2	2	2	2
3	4	3	3
4	5	4	4
5	6	5	5
6	8	6	6
7	3	7	7
8	9	8	8
9	11	9	9
10	12	10	10
11	7	11	11
12	10	12	12
13	13	13	13
14	14	14	14
15	15	15	15

* The test item judged by the majority of the education specialists as being most appropriate for that SBO. For a listing of SBOs and test items, see Appendix A.

TABLE 4

Summary Statistics for Significant Differences Found Between Groups for Various Factors.

Factor	Groups Compared	t	df	p	Conclusion
Age	DCPO Recruit Groups* X DC School Groups**	5.089	240	<.001	DC School Groups older
GCT Scores	DCPO Exp 1 and Con Groups+ X DCPO Exp 2 Group	3.907	200	<.001	DCPO Exp 2 Group higher
Reading Skill Levels	DCPO Exp 1 Group X DCPO Con Group	1.993	164	<.05	DCPO Con Group Lower
	DCPO Exp 1 Group X DCPO Exp 2 Group	3.05	127	<.001	DCPO Exp 1 Group lower
Pre-test Scores	DCPO Recruit Groups X DC School Groups	24.227	204	<.001	DCPO School Groups higher
	DCPO Exp 1 Group X OBA Exp 1 Group	3.85	185	<.001	OBA Exp 1 Group higher
Post-test Scores	DCPO Exp 1 Group X DCPO Exp 2 Group	2.242	127	<.05	DCPO Exp 1 Group lower
	DCPO Exp 1 Group X DCPO Con Group	10.213	164	<.001	DCPO Exp 1 Group higher
	DC School Exp Group X DC School Con Group	2.247	38	<.05	DC School Exp Group higher
	DC School Exp Group X DCPO Exp 1 Group	10.973	114	<.001	DC School Exp Group higher
	DCPO Exp 1 Group X OBA Exp 1 Group	7.47	185	<.001	OBA Exp 1 Group higher
	OBA Exp 1 and Exp 2 Groups++ X OBA Con Group	23.996	199	<.001	OBA Exp 1 and Exp 2 Groups higher

* Includes DCPO Exp 1, Exp 2 and Con Groups.

** Includes DC School Exp and Con Groups.

+ GCT Scores of DCPO Exp 1 and Con Groups combined.

++ Post-test Scores of OBA Exp 1 and Exp 2 Groups combined.

TABLE 5

Summary Statistics for Pre- and
Post-Test Scores of Different Subject Groups.

Subject Group	Pre-Test Scores			Post-Test Scores	
	N	$\bar{x}$	sd	$\bar{x}$	sd
OBA Exp 1	94	4.55	1.83	12.34	2.73
OBA Exp 2	44	-	-	12.59	2.55
OBA Con	63	4.03	1.97	4.02	2.11
DCPO Exp 1	93	5.63	2.00	9.46	2.54
DCPO Exp 2	36	-	-	10.50	2.29
DCPO Con	73	5.38	1.73	5.97	1.86
DC School Exp	23	11.96	1.49	14.00	1.53
DC School Con	17	12.18	1.34	12.82	1.72

APPENDIX A
Specific Behavioral Objectives (SBOs)
and
Test Items for the OBA and DCPO Films.

OBA Film

Specific Behavioral Objectives (SBOs)

<u>No.</u>	<u>Content</u>
1	Identifying the primary use of the OBA
2	Identifying the source of oxygen
3	Recalling by what method oxygen is cooled
4	Describing how oxygen is supplied
5	Naming the elements needed to produce oxygen
6	Indicating how eyepieces are kept clear of fogging
7	Indicating how system is put into operation
8	Identifying method used to determine when system is running out of oxygen
9	Name maximum range of time that system is designed to be effective
10	Describe manner in which the system is started manually
11	Indicating proper method of resupplying oxygen
12	Recognizing that the oxygen canister contains caustic chemicals
13	Recalling that the oxygen supply in contact with oil will create a hazard
14	Determining proper environment for use of OBA
15	Identifying what will cause system to fail

Test Items

<u>No.</u>	<u>Content</u>
1	The Oxygen Breathing Apparatus Type A-3 is primarily used for: A. Protection against heat and fire. B. Protection against biological and chemical agents. C. Protection against smoke and similar irritants. D. Protection in underwater environment.
2	The Oxygen Breathing Apparatus Type A-3 uses the following source of oxygen: A. Bottled Oxygen. B. Compressed Air Tank. C. Oxygen Generating Canister. D. Air Filter System.
3	The OBA Type A-3 system is put into operation by: A. Opening oxygen tank valve. B. Inserting gas filter and starting timer. C. Energizing air compressor. D. Pulling quick-start lanyard.
4	The oxygen produced by the OBA system is cooled by: A. A metal heat exchanger. B. No special means. C. The flow of oxygen through a breathing bag. D. A chemical process.
5.	The oxygen supplied by the OBA depends on: A. Air pressure of 10psi. B. An oxygen line. C. A charcoal filter. D. A chemical oxygen generator.
6.	The continuous supply of oxygen in the OBA system primarily depends on the presence of: A. Carbon dioxide, water vapor, and chemicals. B. A storage tank of oxygen. C. A chemical filter. D. An ozone inhalator.

<u>No.</u>	<u>Content</u>
7	Personnel wearing the OBA in a smoke-filled compartment may safely get a resupply of oxygen by: A. Quickly exchanging tanks. B. Using the buddy system. C. Switching to the reserve supply. D. Going to fresh air environment for resupply.
8	The eyepieces on the OBA facepiece are kept clear of fogging by: A. Special antifog chemicals in the system. B. Thermal glass. C. Air flow only. D. Air drying filter.
9	Where the OBA nears the end of its useful supply of oxygen, the wearer will notice: A. A smell of smoke or irritants in the facepiece. B. A red colored signal in the flow meter. C. Eyepiece fogging. D. Collapse of air breathing tubes.
10	One of the possible hazards relating to the OBA is: A. The handling and disposal of caustic chemicals. B. The overheating of charcoal filters. C. The rupturing of the oxygen pressure line. D. Inoperative flow meter.
11	The OBA is designed to supply oxygen for a period of approximately: A. 10 to 20 minutes. B. 45 to 60 minutes. C. 90 to 120 minutes. D. 3 hours.
12	In order to manually start the OBA system, the wearer must: A. Open the oxygen valve. B. Use own breath to fill the system. C. Connect the compressor line. D. Bypass the filter pack.

<u>No.</u>	<u>Content</u>
13	The OBA can present a hazard if the oxygen supply comes in contact with: A. Oil. B. Silicone. C. Charcoal inhibitors. D. Chemical in the standard fire extinguishing bottles.
14	The OBA works safely under water in depths up to: A. 25 feet. B. 40 feet. C. 90 feet. D. None of these depths.
15	The OBA is a reliable system; however the system will fail to function if: A. The canister is inserted backwards. B. The oxygen valve is closed. C. The heat exchanger overheats. D. The flow meter is in the off position.

DCPO Film

Specific Behavioral Objectives (SBOs)

NO.

CON/ENT

- 1 Identifying the Department responsible for Damage Control.
- 2 Naming the Damage Control Officer.
- 3 Naming the officer that he is directly assigned to.
- 4 Designating the Damage Control Officer Coordinator.
- 5 Selecting three duties of the Damage Control Petty Officer.
- 6 Defining purpose of Material Condition of Readiness.
- 7 Identifying terms used in Material Conditions of Readiness.
- 8 Recalling condition when ship is under maximum watertight security.
- 9 Defining a condition of Modified Material Readiness.
- 10 Naming the area where listing is found.
- 11 Identifying position of a Williams fitting during conditions of readiness.
- 12 Designating when a Dog Zebra fitting is secured.
- 13 Identifying purpose of 3M System.
- 14 Defining what a MRC card is.
- 15 Designating which system is responsible for preventive maintenance.

Test Items

<u>NO.</u>	<u>CONTENT</u>
1	The overall Damage Control Organization is the responsibility of: A. The Engineering Department. B. The Ordinance Department. C. The Hull Technicians. D. The Division Officers.
2	The Damage Control Assistant works directly for the Damage Control Officer who is: A. The Commanding Officer. B. The Executive Officer. C. The Engineering Officer. D. The Fire Control Officer.
3	Damage Control Petty Officers are assigned directly to the: A. Commanding Officer. B. Department Heads. C. Division Officer. D. Engineer Officer.
4	A Damage Control Petty Officer works in close coordination with: A. The Damage Control Assistant. B. The Officer of the Deck. C. The Damage Control Monitor. D. The Executive Officer.
5	Duties of the Damage Control Petty Officer include: A. Train and instruct division personnel on damage control procedures. B. Inspect damage control equipment in assigned spaces. C. Maintain and update list of damage control fittings for assigned area. D. All of the above duties.
6	Material Condition of Readiness has to do with: A. The maintenance and storage of ship supplies. B. Inspection of munitions and stores. C. The protection of the ship against fire and flooding. D. Combat readiness of weapon stations.

7

The terms X-Ray, Yoke, and Zebra are:

- A. Primarily phonetic characters for radio communication transmission.
- B. Used to identify the setting of different degrees of watertightness of the ship.
- C. Never used except during combat or call to general quarters.
- D. Terms used during radar search and early warning exercises.

8

Maximum security of the ship is provided when the following condition is in effect:

- A. X-Ray.
- B. Zebra.
- C. Yoke.
- D. Wilco.

9

Modified Material Conditions of Readiness has to do with:

- A. Allowing movement of personnel through access ways of the ship without asking for special permission.
- B. Storage of dangerous munitions in standby compartments.
- C. Reduced radar watch during night time operations.
- D. Refueling operations at sea.

10

A list of damage control fittings for an assigned area are found:

- A. In the work center lockers.
- B. On a compartment check off list.
- C. In the Executive Officer's Office.
- D. In the general equipment index file.

11

During conditions of readiness X-Ray, Yoke, or Zebra a Williams fitting is:

- A. Kept open.
- B. Automatically closed.
- C. Closed by hand.
- D. Closed only during condition Zebra.

12

Fittings marked with a red Z inside of a black D is a Dog Zebra fitting which indicates:

- A. The fitting may be secured only by the Duty Officer during condition Zebra.
- B. The fitting must be secured during darken ship conditions as well as during Zebra conditions.
- C. The fitting must be closed during daylight hours during condition Zebra when at sea.

<u>NO.</u>	<u>CONTENT</u>
12 (cont'd)	D. The fitting may be opened during condition Zebra for ventilation purposes.
13	The 3-M System used by the Navy has to do with: A. Manpower. B. Monitoring munitions management. C. Preventative Maintenance. D. Modifying and maintaining modules.
14	An MRC card is a: A. Morning Report Card. B. Maintenance Requirement Card. C. Material Request Card. D. Modification Requirement Code Card.
15	The step-by-step procedure for preventative maintenance is provided by: A. The Department officers. B. The Division officers. C. The Division Chief Petty Officer. D. The Maintenance and Material Management System.



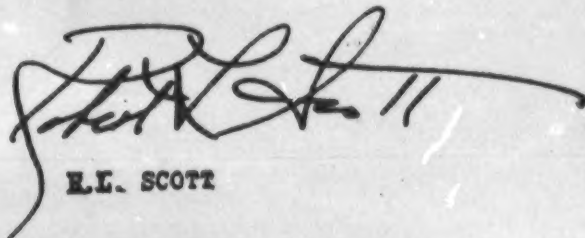
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1. CNETS Study Report 4-75, "Training Effectiveness of Films Developed Using Systems Approach to Training Principles," is promulgated for information.
2. This report was produced as a result of CNETS Task Number 50052-21-PA-08.
3. The conclusions and recommendations contained in the report are those of the writer and are not necessarily those of the Chief of Naval Education and Training Support.
4. This publication has been reviewed under the provisions of SECNAVINST 5600.16 and is approved.



E.L. SCOTT

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21. ABSTRACT (Continue on reverse side if necessary and identify by block number) The Oxygen Breathing Apparatus Type A-3 film (OBA film) and Damage Control Petty Officer film (DCPO film) were evaluated for training effectiveness. Three different recruit groups (Exp 1, Exp 2, and Con groups) were used to evaluate each film. The Exp 1 groups were pre-tested for entrance level knowledge, viewed the film, and received a post-test to determine whether the knowledge level had improved. The Exp 2 groups were not pre-tested, but did view the film and received the post-test. The Con groups were pre- and post-tested but		

20. did not view the film. In addition, enlisted personnel with over two years of Navy experience who were attending a damage control familiarization course at a DC School were tested. These more experienced personnel were divided into two groups -- DC School Exp group and DC School Con group. The DC School Exp group was pre-tested, viewed the DCPO film, and then post-tested. The DC School Con group was pre- and post-tested, but did not view the DCPO film. The results showed that (a) recruits who viewed the films had significantly higher post-test scores than recruits who did not view the films, (b) those recruits who were pre-tested had post-test scores similar to those recruits who were not pre-tested even though the pre- and post-tests were duplicates, (c) personnel with over two years of Navy experience had significantly higher scores on the DCPO pre-test than the recruit groups, (d) the post-test performance of these experienced personnel improved as a result of viewing the DCPO film, (e) and pre- and post-test performance by recruits for the OBA film was significantly better than pre- and post-test performance by recruits for DCPO film even though both recruit groups were similar in age, years of education, reading skill level, and intelligence. The results also show that those recruits who were more intelligent (higher GCT scores), and had better reading skills, had higher post-test scores on both films than recruits who were less intelligent and had poor reading skills. Intelligence, however, appeared to be more important than reading skills to OBA post-test performance. Strong agreement was also found among education specialists who matched the pre- and post-test items with the Specific Behavioral Objectives (SBOs) that were listed for each film. Further analysis showed that only eight of the 15 SBOs listed for the OBA film were trained to the 80% criterion level, while the DCPO film did even more poorly, training only three of the 15 SBOs to this level. Despite these poor achievement levels, the conclusion is made that training can be more effectively managed with these film programs than with any other films that are currently available because the use of SBOs permits accurate correction of inadequate scenarios, while pre- and post-testing allows for more valid measurement of achievement and more effective training management. The recommendation is made that the System Approach to Training (SAT) principles that were used in developing these film programs be used in managing future film procurements.